WHAT IS CLAIMED IS:

1. A liquid crystal optical element comprising:

two substrates;

a liquid crystal layer, which is provided between the two substrates and which includes liquid crystal molecules and dichroic dye molecules; and

at least two electrodes, which are provided on the two substrates, respectively, so as to face each other with the liquid crystal layer interposed between them and which define one of a plurality of unit regions,

wherein in each of the unit regions, the liquid crystal layer includes a first liquid crystal region and a second liquid crystal region within a range, which is approximately half or less as long as the wavelength of visible radiation as measured in a direction that is parallel to the surfaces of the two substrates, the orientation directions of each pair of liquid crystal molecules in the first and second liquid crystal regions having azimuthal directions that define an angle of approximately 90 degrees while no voltage is being applied between the electrodes.

2. The liquid crystal optical element of claim 1, wherein the liquid crystal layer is a smectic liquid crystal layer including a plurality of smectic layers, and

wherein the liquid crystal molecules define a tilt angle

of about 45 degrees with respect to a normal that is defined perpendicularly to the smectic layers.

3. The liquid crystal optical element of claim 2, wherein the smectic liquid crystal layer exhibits an antiferroelectric phase.

4. The liquid crystal optical element of claim 2, wherein the smectic liquid crystal layer exhibits a ferrielectric phase.

5. The liquid crystal optical element of claim 4, wherein while no voltage is being applied between the electrodes, the number of liquid crystal molecules tilting toward one direction from the normal that is defined perpendicularly to the smectic layers is approximately equal to that of liquid crystal molecules tilting toward the opposite direction from the normal.

6. The liquid crystal optical element of claim 2, wherein the smectic liquid crystal layer has a V-shaped switching characteristic.

7. The liquid crystal optical element of claim 2, wherein the liquid crystal molecules of the smectic liquid

crystal layer have a tilt angle of about 43.5 degrees to about 46.5 degrees.

8. The liquid crystal optical element of claim 2, wherein the liquid crystal molecules of the smectic liquid crystal layer have a tilt angle of about 40.3 degrees to about 49.7 degrees.

9. The liquid crystal optical element of claim 2, wherein the liquid crystal molecules of the smectic liquid crystal layer have a tilt angle of about 37.0 degrees to about 53.0 degrees.

10. The liquid crystal optical element of claim 2, wherein the liquid crystal molecules of the smectic liquid crystal layer have a tilt angle of about 32.7 degrees to about 57.4 degrees.

11. A three-dimensional display system including the liquid crystal optical element of claim 1,

wherein the unit regions of the liquid crystal optical element are a plurality of picture element regions that are used to conduct a display operation in response to an image signal supplied, and

wherein the three-dimensional display system alternately

displays a left-eye image component and a right-eye image component on each of the picture element regions, thereby presenting a three-dimensional image thereon, and

wherein a voltage applied between the electrodes in supplying an image signal representing the left-eye image component to each of the picture element regions and a voltage applied between the electrodes in supplying an image signal representing the right-eye image component to the picture element region have mutually opposite polarities.

12. The three-dimensional display system of claim 11, wherein the liquid crystal layer of the liquid crystal optical element is a smectic liquid crystal layer including a plurality of smectic layers, and

wherein the liquid crystal molecules define a tilt angle of about 45 degree with respect to a normal that is defined perpendicularly to the smectic layers.

13. The three-dimensional display system of claim 12, wherein the smectic liquid crystal layer exhibits an antiferroelectric phase.

14. The three-dimensional display system of claim 12, wherein the smectic liquid crystal layer exhibits a ferrielectric phase.

15. The three-dimensional display system of claim 14, wherein while no voltage is being applied between the electrodes, the number of liquid crystal molecules tilting toward one direction from the normal that is defined perpendicularly to the smectic layers is approximately equal to that of liquid crystal molecules tilting toward the opposite direction from the normal.

16. The three-dimensional display system of claim 12, wherein the smectic liquid crystal layer has a V-shaped switching characteristic.